

STREAMLINED LIFE CYCLE ASSESSMENT*

E-COMMERCE PEANUT BUTTER PACKAGING CASE STUDY

PEANUT BUTTER PACKAGE COMPARISON

Peanut butter packaging has evolved quite a bit since the popular spread debuted in glass jars and tins. For this Life Cycle Assessment study, three separate e-commerce packaging scenarios for peanut butter were evaluated with a cradle-to-grave boundary: pouches with fitments in a small corrugated box, which represent the standard measurement for this study; pouches with fitments in a small corrugated box **with an additional overbox**; and PET jars that ship in a corrugated e-commerce case.**



STAND-UP POUCH



STAND-UP POUCH WITH OVERBOX

The standard against which all other formats were measured



PET JAR

FOSSIL FUEL CONSUMPTION

The pouch with fitment has the lowest fossil fuel use, followed by the PET jar. The scenario of the pouch with fitment and overbox results in nearly **36%** more fossil fuel used. This is due to the additional corrugated box used in shipment resulting in over **double** the total amount of packaging used (347.2g) vs. just the pouch with fitment (151.7g).

The PET jar pack comes out as preferable to the pouch with fitment in an overbox, as the pack has no dunnage and is very tightly packed; however, the PET jar pack does use more fossil fuel **(+13%)** than the pouch without the overbox.



1.29
MJ-EQUIV



1.76
MJ-EQUIV



1.46
MJ-EQUIV

GREENHOUSE GAS EMISSIONS

When combined with the overbox, the pouch with fitment has much higher GHG emissions **(+47.8%)** than the other two scenarios. The additional corrugated case more than **doubles** the packaging weight of the pouch with fitment in comparison to the scenario without the overbox.

Both the PET jar and pouch with fitment (overbox eliminated) are extremely efficient e-commerce packs, with little air or 'dead space' being shipped—they also have very similar results in overall GHG emissions.



.08491
KG-CO2 EQUIV



.1255
KG-CO2 EQUIV



.08461
KG-CO2 EQUIV

WATER CONSUMPTION

The base scenario of water use comparison for the pouch with fitment and PET jar **(+14%)** are quite similar, while the pouch with the additional overbox results in approximately **27%** higher overall water use. Corrugated and paper production tend to be much more water intensive than the production of plastic pouches, so the increased corrugated use from the overbox drives water use significantly higher.



END OF USE SUMMARY

SOURCE REDUCTION BENEFITS

Flexible packaging offers the ability to source reduce, which is one of the most preferred methods of waste management, according to the U.S. EPA Waste Hierarchy.

As a result, a major benefit of flexible packaging is the high product-to-package ratio that it offers.

HIGH product-to-package ratio:



LOW product-to-package ratio:



RECOVERY BENEFITS






While the PET jar pack is well optimized for e-commerce—and its main materials are considered recyclable—just the polypropylene lid and lidstock weigh nearly the same as the entire flexible pouch with fitment.

Limiting the amount of packaging used in the design phase can have significant environmental impacts all the way up through e-commerce delivery packaging. While the flexible stand-up pouch is not recyclable, it limits the amount of material used and has the lowest amount of packaging sent to landfill.

IMPLICATIONS

E-commerce provides a unique application in that products are handled nearly three times as frequently to get from producer to consumer compared to traditional retail channels. Therefore, it is vital that the package is designed to survive the additional handling. The pouch with fitment has the lowest or nearly lowest material discarded, energy usage, GHG emissions and water use when compared to the other packs. In all of the peanut butter scenarios reviewed, the primary packs were made from materials that can limit damage and leakage, an important consideration in e-commerce packaging.

PEANUT BUTTER PACKAGING COMPARISON SUMMARY

FORMAT	FOSSIL FUEL CONSUMPTION (MJ-EQUIV)	GHG EMISSIONS (KG-CO ² EQUIV)	WATER USE (l)	PRODUCT-TO-PACKAGE RATIO AND PERCENT WT.	PKG LANDFILLED (G)/1,000 KG PEANUT BUTTER
STAND-UP POUCH 	1.29	.08491	22.01	7:1 87.4%:12.6%	41,910
STAND-UP POUCH WITH OVERBOX 	1.76 (+36.0%)	.1255 (+47.8%)	28.08 (+27.5%)	3.0:1 75.2%:24.8%	59,446 (+41.8%)
PET JAR 	1.46 (+13.1%)	.08461 (-0.36%)	25.21 (+14.5%)	6.2:1 86.1%:13.9%	54,113 (+29.1%)

For more information and methodologies of assessments, please visit www.flexpack.org to download the "Sustainability and Life Cycle Impacts of Flexible Packaging in E-commerce" report. For additional findings on the impact of flexible packaging on dimensional weight and shipping costs, visit www.flexpack.org/resources/sustainability-resources.